

# FACIAL VERIFICATION linked to a PIN Code

Supplied by Chris Le Sueur

*In conjunction with I-CUBE*



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**I-CUBE**

# **Requirement: BIOMETRIC AUTHENTICATION LINKED TO A PIN**

**The solution is to provide a Facial Recognition System (FRS) to facilitate ACCESS LOGGING linked to a PIN.**

**The software will MONITORING & REPORT all staff (& visitors) entering and exiting the FACILITY.**

## Facial Recognition

What is facial recognition?



- ! Face recognition is a non-intrusive, biometric method of matching a given face to a previously stored template of the face.
- ! Can be used to verify one person against a number (T&A) AND
- ! Can be used to identify one or many persons against an image database
- ! Can be used to identify a possible shop lifter / thief / suspect against an image database

# Facial Recognition

## 2D vs 3D

2D

- ❗ 2D systems typically used for identification comparing an image captured with static images. Security personnel tries to find a match

- ❗ 3D systems typically used for verification of people or for identifying with minimal on no personnel involvement

3D



# Facial Recognition

## 2D System

- ! Creation of many multiple different databases
- ! Each database can contain images of suspects, wanted people, ex workers, delivery people, regular visitors etc.
- ! Searching different databases to confirm identity of a suspect



- ! The surveillance operator manually compares the live or recorded images (from any camera source) & saved facial images against a database of previously saved images, with an operator reviewing results and making FINAL decision.

# Facial Recognition

## 2D System

The screenshot displays a facial recognition software interface. On the left is a database table with columns for Username, Name, Age, and Sex. The 'Director' row is highlighted. Below the table is a smaller table with columns for Filename, Use, and Valid. The main area on the right features a large image of a man's face with yellow crosshairs indicating facial landmarks. To the left of this image is a smaller thumbnail of the same man. Below the main image is a 'Compare Recent Image' button. To the right of the main image are checkboxes for 'Find eyes' and 'Find lips', and an 'Acquire Image' button. Below the main image area are tabs for 'Compare Results', 'Recent Operations', and 'Database Operations'. At the bottom, there is a gallery of five face images, each with a filename and a date below it.

Username	Name	Age	Sex
Vincent	Dean	8	True
test01	test	2	True
Ted	Dean	4	True
Blaine	Blaine	1200140	True
Image	Test		True
Dudley	Dary	12112	True
Acacia	US	12345680	True
Andrew	Andrew Hays	8	True
Director	123	18	True
Mpongani	498	18	True
Lucretia	KS	20	False
Marilyn	MA	447373	True
Allen	AL	800	False
Aranna	AS	8076283	True
Azani	AS	8484	True
Baby	Folan	Lots of imag	True
multiple images	Males	legals	True
Hue	Sharon	04704	True
1	2		True

Filename	Use	Valid
Image_001.jpg	True	True
Image_002.jpg	True	True

Compare Results | Recent Operations | Database Operations

1230.jpg 10/0/00 Dugan\_001.jpg  
94 8/0/00 4\_001.jpg  
where have Arden 7/3/00 Acacia\_003.jpg  
All Aranna 7/3/00 sgn\_aranna\_1.jpg  
Dean Test 2/0/00 Turk\_003.jpg

## Facial Recognition

### 2D System – So what does it do?

#### The solution allows for: -

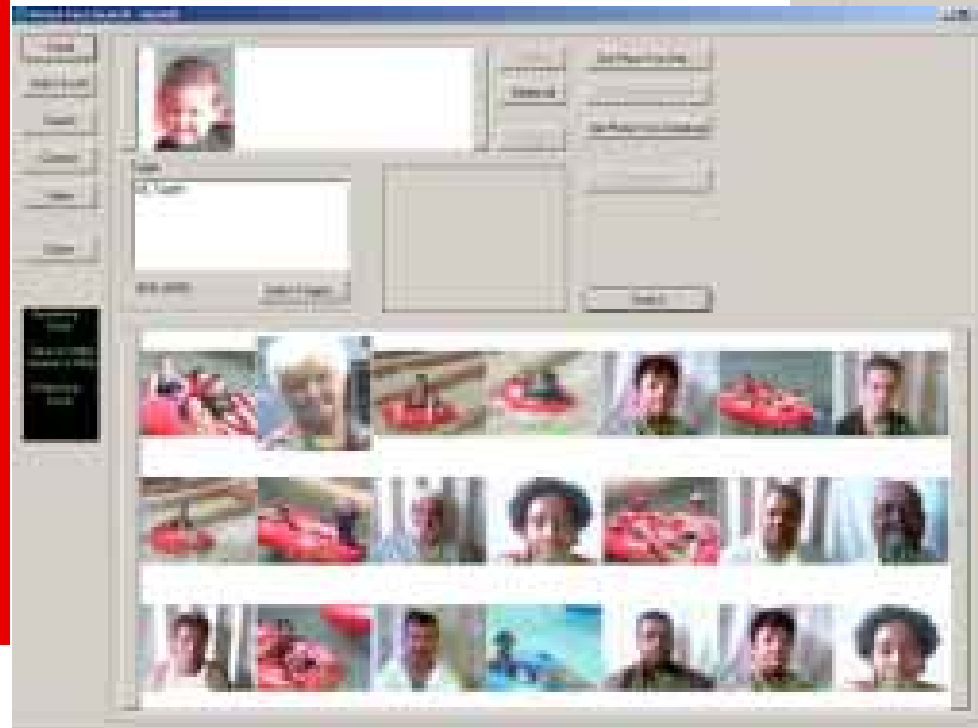
- Image capture of the person from a high resolution colour camera;
- Face finding within the image;
- Linking of the face with various fields (ID no., name, Birth, Sex, hair Colour, Ht, Wt, Address – if known);
- Searching database and display of results;
- Entry of images/ details not in the database;



# Facial Recognition

## 2D System – Image capture

**Image Capture**



**Result Display**



**Facial Recognition  
3D System**

# Deploying HNET 3D technology to verify people enrolled in the system against a pin

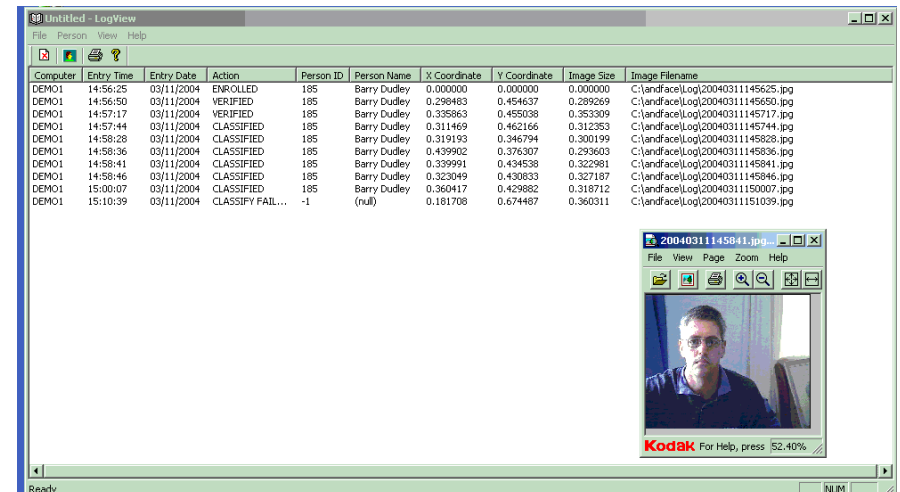


## Facial Recognition

### 3D System – What does this do?

#### The solution allows for: -

- Multiple image capture of the person from a high resolution colour camera;
- Face finding within the image;
- Searching database and display of results;
- Entry of images/ details not in the database;
- Compilation of image database per individual that includes multiple perspectives, expressions and head placements
- Automatic assessment of people being scanned.
- Opening of door or turnstyle if person is allowed
- Alarm if person is not allowed
- Sending of result to a PDA
- Logging of all people who have passed the camera



## Facial Recognition

### 3D System – What does this do?

#### Enrolment procedures and options: -

- Pre-register users from current databases of workers
- When worker wants to be enrolled system takes person through the enrolment with audio & camera
- FRS will ask you to provide a wide range of different expressions and facial sizes
- When the person is next seen FRS system will identify them more accurately



## Facial Recognition

### 3D System – Solution components

#### The solution comprises: -

- The 3D Facial Identification solution proposed is to provide Advanced I-CUBE Biometrics Facial Recognition, to facilitate the VERIFICATION of a person enrolled via a USB camera attached to a computer



## Facial Recognition

### 3D System – Solution components

#### Additionally: -

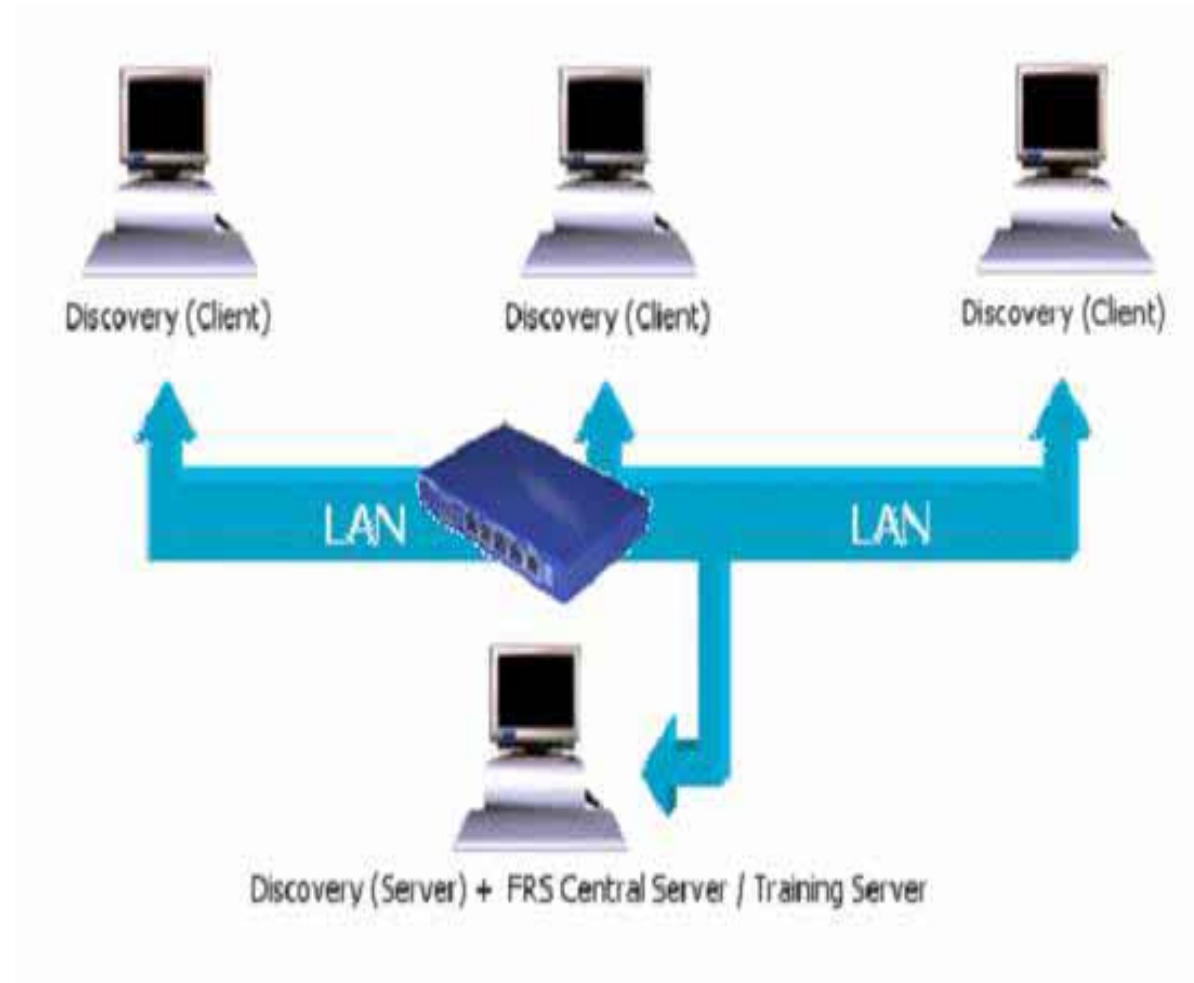
- Advanced FACIAL VERIFICATION Software (Server and a no. of clients)
- S-912 Video Grabber hardware to connect the camera via RCA to the Windows based PC's (if existing cameras used)
- Existing (or new) cameras



## Facial Recognition

3D System – How does this get connected?

FRS Network (multiple clients, one server): -



## Facial Recognition

3D System – What are the benefits?

Speed, accuracy and intelligence are among the key qualities

# Facts, features and benefits *of facial recognition*

New real-time security alternatives are a reality today, says Lodge, with its lightning fast face recognition system. A leading developer of mission critical retail solutions, Lodge says it is committed to leadership, responsiveness and unparalleled results. "We are driven to empower our clients and partners to go beyond tradition to create new benchmarks for security.

Accuracy is everything."

48 Security Focus April 2004



**Facial Recognition**

**3D System – Speed**

**Using a revolutionary core technology HNet, based on neural networks, I-CUBE facial recognition delivers cutting-edge security and split-second processing times.**

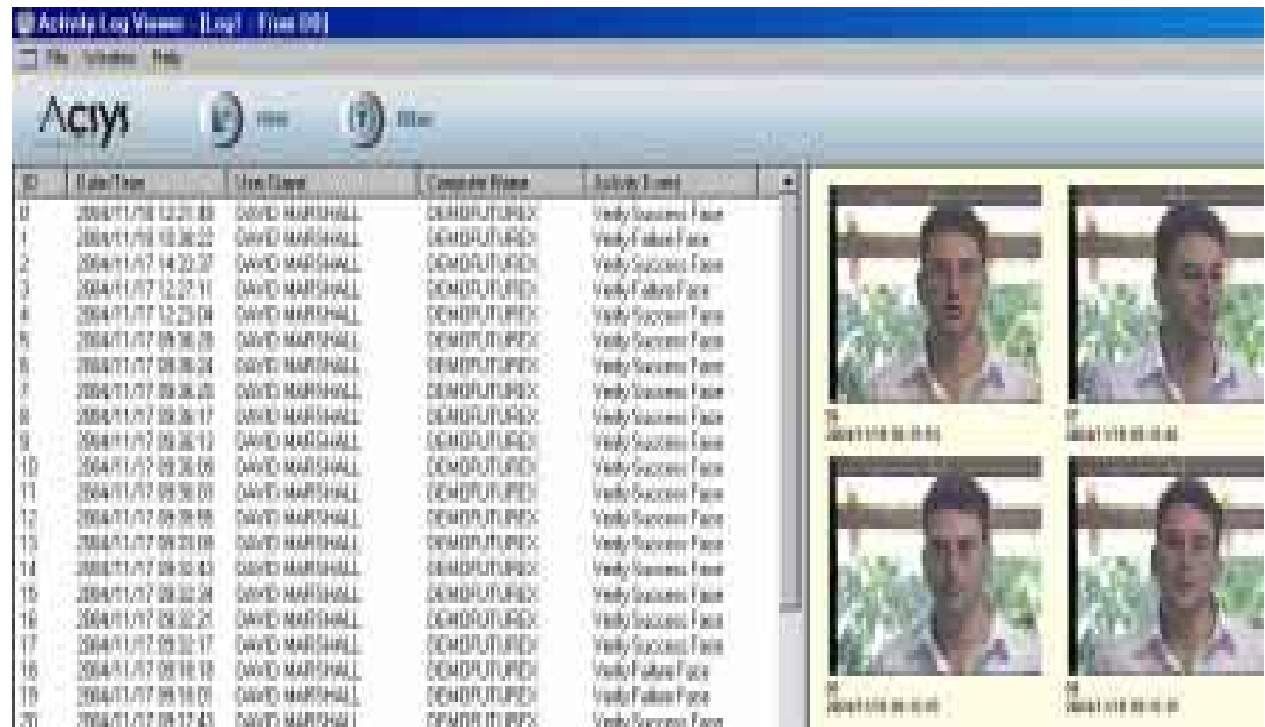




## Facial Recognition

### 3D System – Accuracy

The proposed FRS was the most accurate technology tested in the International Biometric Group's Comparative Testing for IT Security and E-Commerce



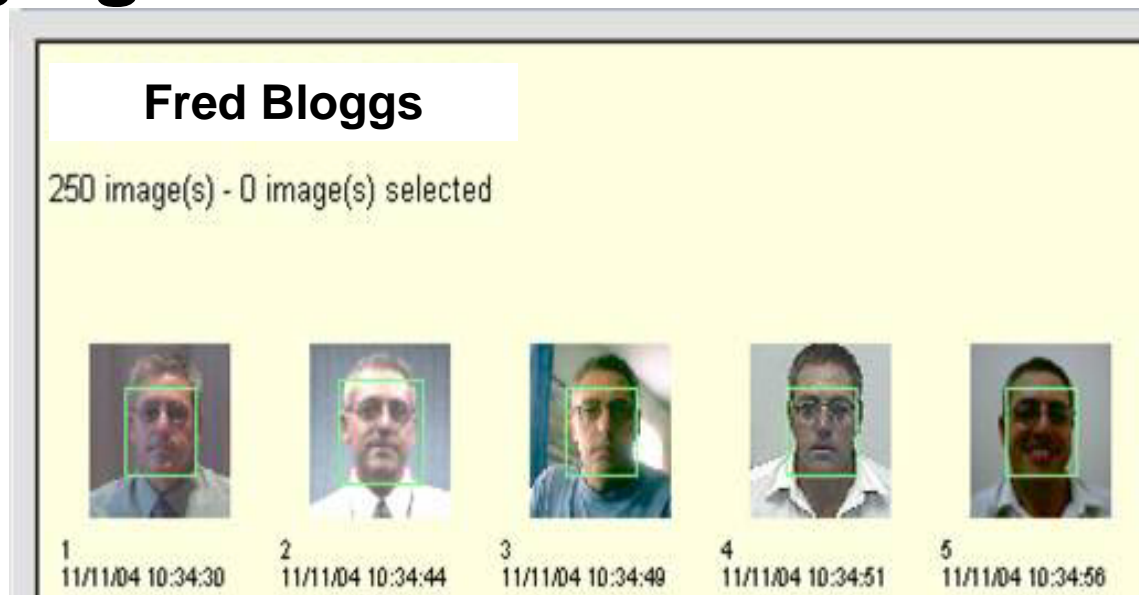
The screenshot displays the Acyis facial recognition software interface. The main window is titled "Activity Log Viewer" and contains a table of activity logs. The table has five columns: ID, Date/Time, User Name, Computer Name, and Activity Detail. The data shows a series of successful and failed face verifications for a user named "DAVID MARSHALL" on a computer named "DEMOFLUTURE". To the right of the table, there is a grid of four small images showing a person's face from different angles and positions, illustrating the system's ability to recognize faces in various orientations.

ID	Date/Time	User Name	Computer Name	Activity Detail
0	2004/11/18 12:21:00	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
1	2004/11/18 13:36:22	DAVID MARSHALL	DEMOFLUTURE	Verify Failed Face
2	2004/11/17 14:23:57	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
3	2004/11/17 12:57:11	DAVID MARSHALL	DEMOFLUTURE	Verify Failed Face
4	2004/11/17 12:23:04	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
5	2004/11/17 09:36:29	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
6	2004/11/17 09:36:24	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
7	2004/11/17 09:36:20	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
8	2004/11/17 09:36:17	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
9	2004/11/17 09:36:13	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
10	2004/11/17 09:36:09	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
11	2004/11/17 09:36:05	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
12	2004/11/17 09:36:01	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
13	2004/11/17 09:35:58	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
14	2004/11/17 09:35:54	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
15	2004/11/17 09:35:50	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
16	2004/11/17 09:35:46	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
17	2004/11/17 09:35:42	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
18	2004/11/17 09:19:19	DAVID MARSHALL	DEMOFLUTURE	Verify Failed Face
19	2004/11/17 09:19:01	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face
20	2004/11/17 09:17:43	DAVID MARSHALL	DEMOFLUTURE	Verify Success Face

## Facial Recognition

### 3D System – Intelligence

The proposed FRS learns, remembers and recognises, becoming more familiar with your face each time it sees you, adjusting for difference due to aging and cosmetics.



## Facial Recognition

**3D System – What does it look like to the person using the system?**

- ! The display area will show the image as seen by the camera and will scan the image and look for facial features and will track onto the faces
- ! The system, once it has tracked onto a face – illustrated by the markings around the face- will then compare the algorithm derives from the image with the template in the database and the user entered number (PIN).
- ! The match will be identified through a voice module and on the screen



## Facial Recognition

3D System – What does it look like to the person using the system?



## Facial Recognition

### Equipment required:

ITEM	DETAIL	No. Provided
Face Recognition SERVER	Ability to add facial images and personal details, create multiple Databases, view closest matches	1
Face Recognition CLIENTS	Ability to capture from a VIDEO FOR WINDOWS source and	1 - many
Camera	USB Video capture device	1 - many
PC	<ul style="list-style-type: none"><li>• Microsoft® Windows® 2000 Professional (SP 4)</li><li>• 3 GHz Pentium 4 Processor</li><li>• 1 GB RAM</li><li>• 1 TB HDD</li></ul>	If required
Monitor	15" screen	If required
Key & M	Keyboard & Mouse	If required
Training	Manual & On-Site	If required
Support	E-mail, Telephone, On-Site	If required

## Facial Recognition

3D System – Is this system better than the 2D?

- ! The system proposed is the 3D system and the latest version will incorporate the 2D component as well providing the best of both worlds
- ! The 3D system provides the ability to allow the system to work rather than getting people to scan through systems and initiate the database queries
- ! The increasing usage of 3D technology indicates the significant value derived from this technology in deterring crime, logging workers and visitors and providing a fool proof verification system

## **Solution Proposed**

**This FRS  
solution allows: -**

- Multiple image capture by web cameras;
- Face finding within the image;
- Multiple image capture by web camera;
- Facial verification at a high accuracy (with multiple images of the person in the database);
- Linking of a PIN number with a name and display of this information on ELECTRONIC DISPLAY (screen) when the person is detected;
- Log of number and image of all PERSONS who enter and exit the facility;
- Facial image saved for later review
- Automatic updating of images in database as person changes.

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